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## (54) Pivot bearings

(57) A pivot bearing 14, 17 for a pair of arms or levers, said bearing comprising a cylindrical pivot portion which, in use, extends through corresponding apertures 12 in said arms or levers or in members associated therewith, said pivot bearing incorporating a pair of spaced radially extending flanges 16, 19, the pivot portion and flanges comprising a material which has a tensile strength of from 500,000 to 800,000 grams per square centimetre and a modulus of elasticity of  $8.5 \times 10^7$  to  $3 \times 10^8$  gram centimetres izod. The invention also includes a cutting device, e.g. a pair of scissors, comprising a pair of arms or levers pivoted together by such a pivot bearing.

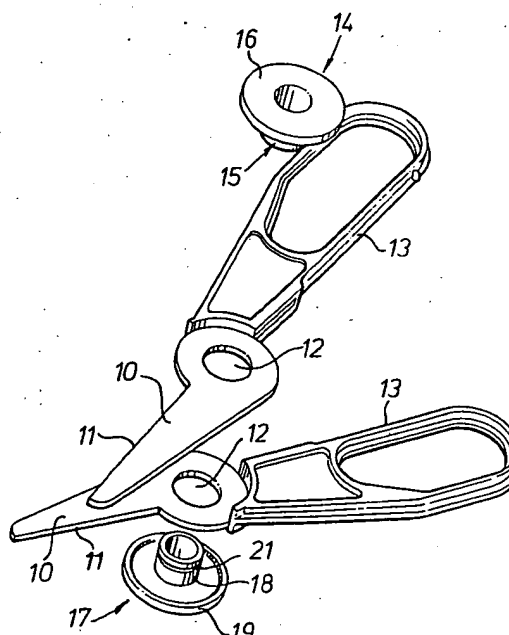


FIG.1

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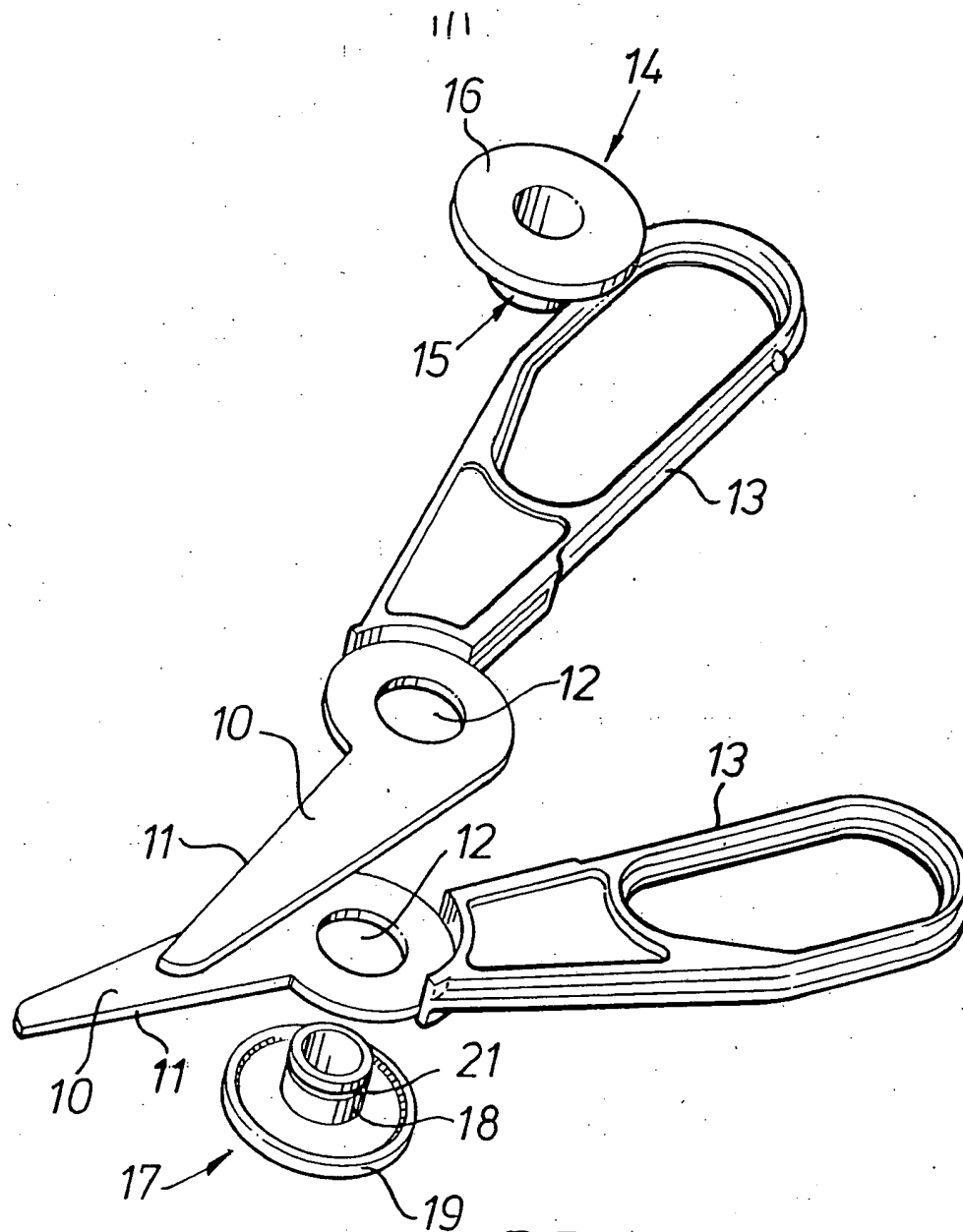


FIG. 1

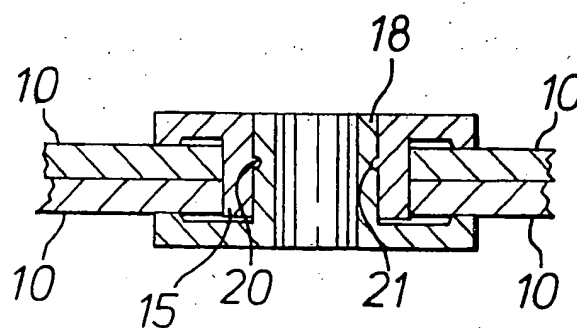


FIG. 2

## SPECIFICATION

## Pivot bearings

5 This invention relates to pivot bearings, and more particularly concerns a pivot bearing for connecting a pair of relatively movable arms or levers. The invention also concerns cutting devices incorporating such a bearing.

10 Conventionally, scissors comprise a pair of blades each having a handle secured thereto and connected together by means of a pivot. In order to achieve a cutting action the blades are twisted out of a flat plane so that the contact between the cutting edges of the blades proceeds from the inner end to the outer end of the cutting edges as the two handles are brought together.

The user of such scissors has to apply force in two directions in order to achieve cutting. Firstly, he must apply a force in a plane generally perpendicular to the axis of the pivot to bring the handles together and he must also apply a force to the handles in a plane parallel to a plane which includes the axis of the pivot. This second force is required in order to maintain the contact of the cutting edges of the blades as it moves along the blade with the bringing together of the handles.

According to one aspect of the present invention we provide, a pivot bearing for a pair of arms or levers, said bearing comprising a cylindrical pivot portion which, in use, extends through corresponding apertures in said arms or levers or in members associated therewith, said pivot bearing incorporating a pair of spaced radially extending flanges, the pivot portion and flanges comprising a material which has a tensile strength of from 500,000 to 800,000 grams per square centimetre and a modulus of elasticity of  $8.5 \times 10^7$  to  $3 \times 10^8$  grams per square centimetre.

Preferably the material has an elongation of 10% to 150%. It is also preferred that the material has a flexural strength of  $6 \times 10^5$  to  $1 \times 10^6$  grams per square centimetre.

It is desirable that the material has an impact strength of from  $1.4 \times 10^4$  to  $5.5 \times 10^4$  gram centimetres izod.

Where the pivot bearing is to be employed in applications where relatively high temperatures or high moisture content environments are experienced, then it is desirable that the bearing should have a high softening point, i.e. from 180°C to 250°C, and a water absorption in the range 0 to 1.5 after 24 hours immersion.

In general terms, a preferred bearing has dimensions such that the diameter of the flanges is equal to, or greater than, twice the diameter of the cylindrical pivot portion. When used in conjunction with an arm or lever, the bearing length of the pivot portion is desirably equal to, or greater than, twice the bearing length of the lever and, preferably, the bearing length of the lever is substantially equal to the thickness of the lever.

Where the pivot bearing is to be used for a cutting device then the major diameter of the pivot is desirably equal to, or greater than 2.5 cm. The diameter of the pivot portion is desirably greater than, or equal

to 0.5 cm, and the length of the pivot portion is desirably equal to, or greater than 0.3 cm.

When the bearing is assembled with a pair of arms or levers, then it is desirable that the thickness of the arms or levers should be equal to, or greater than 0.15 cm.

According to another aspect of the present invention, we provide a cutting device comprising a pair of arms or levers, each having a handle projecting therefrom, and a pivot bearing pivoting the pair of arms or levers together, said pivot bearing being as described above.

According to yet another aspect of the present invention, we provide a cutting device comprising a pair of twisted blades each having a cutting edge and each having a handle projecting therefrom, and a pivot bearing as described above.

Advantageously the pivot bearing comprises two pivot parts each comprising a flange and a spigot portion projecting therefrom, the first part having a hollow cylindrical spigot portion, the external surface of which constitutes the pivot portion, and the second part having a cylindrical spigot which locates within the hollow cylindrical spigot on the first part.

The two spigot portions may be retained together by any suitable means bearing in mind that a relatively rigid connection is necessary in order that the resilient flanges can achieve their desired function. Thus the spigot of the second part may be an interference fit in the hollow cylindrical spigot of the first part and may also be provided with co-operating formations for locating the spigots in the desired position, e.g. a co-operating rib and groove.

Whilst it is possible to produce satisfactory pivot bearings using a mechanical securing arrangement it is preferred that this be replaced or supplemented by adhesive means. This may comprise the application of a suitable adhesive or, where appropriate materials are employed, a welding technique may be used.

The pivot bearing preferably comprises a plastics material which may be produced, for example, by injection moulding.

Reference is now made to the accompanying drawings in which:

Figure 1 is a perspective view of a pair of scissors in accordance with the present invention; and

Figure 2 is a cross section of the pivot member of the scissors shown in Figure 1.

The scissors comprise a pair of twisted blades each blade having a cutting edge 11 and a pivot aperture 12. A handle 13 of suitable plastics material such as nylon is moulded on to each blade.

The pivot bearing comprises two parts, the first part 14 comprising a cylindrical spigot portion 15 and a flange 16 and the second part 17 comprising a spigot 18 and a flange 19.

The external cylindrical surface of the spigot 15 locates in the apertures 12 in the blades 10 and constitutes the pivot therefor. In order to assemble the pivot member the spigot 18 is inserted into the hollow cylindrical part of the spigot 15 and is a close interference fit therewith. A mechanical location and retention means is provided in the form of a rib 20 extending around the spigot 15 which engages in a

corresponding recess 21 in the spigot 18.

It has been found that the retention of the spigot 18 in the spigot 15 is greatly enhanced by the provision of a suitable adhesive bond. The rigid connection of the two spigots is, of course, necessary in order to achieve the desired advantageous features of the scissors of the invention.

The pivot parts are preferably produced by injection moulding from a suitable plastics material. We have found that a plastics material which is particularly suitable for this application has the following physical properties:—

Water Absorption	0.8 % (24 hours)
Tensile strength	632,500 grams/sq cm
15 Elongation	80 %
Modulus of elasticity	$8.5 \times 10^7$ grams/sq cm
Impact strength	$1.4 \times 10^4$ grams cms
Flexural strength	$6 \times 10^5$ grams/sq cm
Softening point	250 °Cent

The scissors described above have considerable advantages over scissors utilising a conventional metal pivot. First of all an advantage to a user is that it is not necessary to provide a force on the handles in a plane perpendicular to the axis of the pivot during cutting. This makes a cutting a simpler operation which is also less tiring to the fingers. Furthermore, since the cutting operation is simplified it is possible for them to be used either with the left or right hand with equal ease.

It is believed that the reason for the above advantages is the fact that the combination of the large diameter pivot with the resilient flanges is such as to retain the blades in the desired relative position during cutting and, furthermore, the force which urges the cutting edges of the blades towards one another is provided by the resilient flanges rather than by the fingers of the user.

Another advantage of the construction described above is that the length of the pivot does not become permanently increased so that the blades can move relative to one another other than in a plain perpendicular to the pivot axis. Such stretching, which is common with conventional scissors, causes the cutting action of the blades to become impaired. Consequently the scissors according to the present invention have a greatly increased life as compared with conventional scissors.

Furthermore, the provision of a pivot bearing which has a low water absorption and relatively high softening point facilitates sterilization of the scissors, for example, in boiling water.

#### CLAIMS

1. A pivot bearing for a pair of arms or levers, said bearing comprising a cylindrical pivot portion which, in use, extends through corresponding apertures in said arms or levers or in members associated therewith, said pivot bearing incorporating a pair of spaced radially extending flanges, the pivot portion and flanges comprising a material which has a tensile strength of from 500,000 to 800,000 grams per square centimetre and a modulus of elasticity of  $8.5 \times 10^7$  to  $3 \times 10^8$  gram centimetres izod.

2. A pivot bearing according to claim 1 in which the material has an elongation of 10% to 150%.

3. A pivot bearing according to claim 1 or 2 in

which the material has a flexural strength of  $6 \times 10^5$  to  $1 \times 10^6$  grams per square centimetre.

4. A pivot bearing according to any of claims 1 to 3 in which the material has an impact strength of  $1.4 \times 10^4$  to  $5.5 \times 10^4$  gram centimetres izod.

5. A pivot bearing according to any of claims 1 to 4 in which the material has a softening point of from 180°C to 250°C and a water absorption in the range 0 to 1.5 after 24 hours immersion.

6. A pivot bearing according to any of claims 1 to 5 in which the diameter of the flanges is equal to or greater than twice the diameter of the cylindrical pivot portion.

7. A pivot bearing according to any of claim 1 to 6 comprising two pivot parts each comprising a flange and a spigot portion projecting therefrom, the first part having a hollow cylindrical spigot portion, the external surface of which constitutes the pivot portion and the second part having a cylindrical spigot which locates within the hollow cylindrical spigot on the first part.

8. A pivot bearing according to claim 7 in which the spigot on the second part is an interference fit in the hollow cylindrical spigot of the first part.

9. A pivot bearing according to claim 7 or 8 in which the spigots are provided co-operating formations for locating them in the desired position.

10. A pivot bearing according to claim 9 in which the co-operating formation is a rib and groove.

11. A pivot bearing according to any of claims 1 to 10 comprising a plastics material and formed by injection moulding.

12. A pivot bearing substantially as herein described with reference to and as shown in the accompanying drawings.

13. A cutting device comprising a pair of arms or levers, each having a handle projecting therefrom and a pivot bearing pivoting said arms or levers together, said pivot bearing being as claimed in any of claims 1 to 12.

14. A cutting device comprising a pair of twisted blades each having a cutting edge and each having a handle projecting therefrom and a pivot bearing as claimed in any of claims 1 to 12 pivoting said blades or handles together.

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